REPORT
SOILS AND FOUNDATION INVESTIGATION

PROPOSED BUILDING ADDITIONS
LYONS, NEW JERSEY
VETERANS ADMINISTRATION MEDICAL CENTER

November 11, 2011

Prepared By:
Melick-Tully and Associates, P.C.
117 Canal Road
South Bound Brook, NJ 08880
Tel: 732-356-3400 Fax: 732-356-9054

MTA Project No. 8743-002*1D

MELICK-TULLY
AND ASSOCIATES, P.C.
GEOTECHNICAL ENGINEERS AND
ENVIRONMENTAL CONSULTANTS

Principals:
RAYMOND J. TULLY, P.E.
EUGENE M. GALLAGHER JR., P.E.
ROBERT E. SCHWANKERT, P.E.
TODD E. HOROWITZ, P.E.
MARK R. DENNO, P.E.

Senior Associates:
RICHARD D. LEV, CPG
JAMES H. BEATTIE, P.E.

Associates:
CHRISTOPHER P. TANSEY, P.E.

Consultants:
THOMAS E. TULLY, P.E.
CHARLES T. MELICK, P.E.
ROBERT J. VAN ORDEN, P.E.

November 11, 2011

Veterans Administration Medical Center
c/o Fellenzer Engineering, LLP
22 Mulberry Street, Suite 2A
Middletown, New York 10940

Attention: Mr. Ryan Fellenzer

Report
Soils and Foundation Investigation
Proposed Building Additions
Lyons, New Jersey
Veterans Administration Medical Center

Introduction

This report presents the results of a soils and foundation investigation performed by Melick-Tully and Associates, P.C. (MTA) for two additions to be constructed at the existing Veterans Administration Medical Center facility located at 151 Knollwood Road in Lyons, Somerset County, New Jersey. The approximate location of the project is shown on the Site Location Map, Plate 1. This report was prepared in general accordance with our proposal dated October 14, 2011.

Proposed Construction

Information provided to us indicates that two, two-story additions will be constructed and will abut the west side of the existing CLC structure. Each addition would have a footprint area of approximately 6,400 square feet. We understand that the additions would be slab-on-grade structures and would not contain basements. We further understand that the finished floor level of the proposed additions would match the floor slab level of the existing structure (+316 feet) requiring minor cuts and fills on the order of five feet or less to reach the proposed floor slab levels.

Please Reply to:
☑ NJ OFFICE: 117 Canal Road, South Bound Brook, NJ 08880 / Phone: (732) 356-3400 Fax: (732) 356-9054
☐ NY OFFICE: 324 Route 208, Monroe, NY 10950 / Phone: (845) 783-9190 Fax: (845) 783-5060

Structural loading information was not provided to us; however, structures of the type planned would typically impose maximum column and ground floor slab live loads on the order of 200 kips and 125 pounds per square foot, respectively.

Purpose and Scope of Work

The purpose of our services was to:

1) explore the subsurface soil, rock and groundwater conditions within the proposed building addition areas;
2) estimate the relevant geotechnical engineering properties of the encountered materials;
3) evaluate the site foundation requirements considering the anticipated structural loads and encountered subsurface conditions;
4) recommend an appropriate type of foundation for support of the proposed structures, and provide geotechnical-related foundation design and installation criteria, including an estimate of the Site Class as defined by the International Building Code 2009, New Jersey Edition, for seismic design purposes;
5) provide recommendations for the support and the need for subdrainage of the lowest level floor slabs;
6) estimate the post-construction settlements of the recommended floor and foundation systems;
7) perform laboratory chemical analysis on two of the samples to determine their possible corrosion potential on concrete and ductile iron; and
8) discuss appropriate earthwork operations or considerations consistent with the proposed construction and encountered subsurface conditions.

To accomplish these purposes, a subsurface exploration program consisting of eight test borings was performed at the site, with four borings performed within each addition area. The borings were advanced utilizing truck-mounted, hollow-stem auger drilling equipment and extended

to depths of approximately 20 to 26 feet below the existing surface grades. The approximate locations of the explorations are shown on the Plot Plan, Plate 2.

All work was performed under the direct technical observation of a geologist from MTA. Our representative located the explorations in the field utilizing surveyed locations provided by Fellenzer Engineering, maintained continuous logs of the explorations as the work proceeded, and supervised the soil sampling operations. Numerous closely spaced soil samples were obtained from the borings in general accordance with the procedures of the Standard Penetration Test. A five-foot rock core sample was obtained from Boring No. 1 using an NQ size core barrel.

Detailed descriptions of the materials encountered in the explorations are shown on the individual Logs of Borings, Plates 3A through 3H. The soils were visually classified in general accordance with the Unified Soil Classification System presented on Plate 4, and the Engineering Rock Classification and Core Description Chart presented on Plate 5.

All soil and rock samples obtained from the explorations were brought to our office where they were further examined in our soil mechanics laboratory. Several of the samples were subjected to laboratory testing consisting of grain-size analyses and moisture content determinations to aid in their engineering classification and evaluation. The results of the grain-size testing are presented on Plate 6, Gradation Curves, and the results of the moisture content testing are presented on Plate 6 and on the appropriate exploration logs. Two of the samples were sent to an independent laboratory for chemical analysis to evaluate the corrosive potential of the soils on concrete and ductile iron pipe. The results of that testing will be provided to you in an addendum to this report when completed.

The results of our subsurface exploration program, visual examination of the soil and rock samples, and review of the laboratory test results have provided the basis for our engineering analyses and geotechnical design recommendations. The following discussions of our findings are subject to the limitations attached as an Appendix to this report.

Site Conditions

Surface Features: The majority of the addition areas are presently relatively open grass covered areas. Several concrete pads and concrete and bituminous walkways were observed. We understand from conversations with Fellenzer Engineering and site personnel that several utilities are present below the proposed additions.

Topographic information shown on plans provided to us indicates that surface grades slope gently downward from north to south, from a high of approximately Elevation +319 feet in the northwest corner of the northern addition to a low of approximately Elevation +312 feet adjacent to the southwest corner of the southern addition.

Subsurface Conditions: The following generalized strata were encountered in the explorations, listed in order of increasing depth:

1) Topsoil: A surficial layer of topsoil was encountered in all of the explorations. The topsoil generally ranged from approximately two to eight inches in thickness.

2) Fill: Fill materials consisting of clayey silts with varying amounts of sand and gravel and sandy gravel were encountered in six of the eight borings. The fill layer extended to depths of approximately two to five and one-half feet below the existing surface grades, where encountered. In several of the explorations, the bottom of the fill consisted of silty sands with roots, which likely represent the original topsoil layer.

3) Silt/Clayey Silt: In seven of the eight explorations, the topsoil and fill were underlain by silt and clayey silt. The silt layer is residual in nature, having been formed by decomposition of the underlying bedrock. The clayey silt

soils were generally found to be stiff to very stiff in consistency and extended to depths of approximately 4 to 13-1/2 feet below the existing surface grades.

4) Decomposed Bedrock: The surficial materials were generally underlain by highly decomposed shale bedrock. The shale bedrock generally consisted of friable rock fragments in a clayey silt matrix. This layer extended to depths of approximately 9 to 16 feet below grade, where encountered.

5) Fractured Shale: Highly fractured shale bedrock was encountered below the residual soils and decomposed bedrock. The shale generally graded sounder with depth until sampler and auger refusal was encountered in a number of the explorations. Five feet of rock core was obtained in Boring No. 1, and indicates the rock has very close joint spacing.

Groundwater was encountered in two of the explorations, Borings No. 5 and 6, at depths of 19 and 15.5 feet below the existing surface grades, respectively, upon their completion. Variable seasonal groundwater conditions are often present in the shale, with perched water often encountered atop the clayey and silty soils, or within the fractures of the rock.

Conclusions and Recommendations

General: Based on the results of our study, it is our opinion that:

1) The proposed additions may derive their support from conventional shallow foundations established on the undisturbed natural soils, decomposed/ fractured shale, or controlled compacted fill placed to reach the desired subgrade levels. The floor slabs may also derive their support from these materials. Removal of existing fill and topsoil would be required from below the addition areas.

2) Relatively sound shale bedrock was encountered below the levels anticipated to be required for construction of the building floor slabs and foundations. Consequently, we believe that excavations required to install footings at conventional depths could be accomplished with excavating equipment having rock teeth.

3) The limited moisture content testing of the existing fill soils indicates that these soils are at or above levels that would allow their immediate reuse as controlled compacted fill. Consequently, aeration and drying of the existing

fill materials and removal of topsoil would be required to reuse them as controlled compacted fill.

4) Groundwater was encountered in only two of the borings at the time of our study at depths of approximately 15.5 to 19 feet below grade and is not anticipated to be a major construction related concern. However, perched seasonal groundwater seepage may be encountered, and some construction dewatering should be anticipated.

Further discussions of these items are presented in subsequent sections of this report.

Site Preparation and Earthwork: The topsoil should be stripped for its full depth from within and at least five feet beyond the proposed building addition limits. The topsoil would not suitable for reuse as controlled compacted fill or backfill in structural areas. Any existing surface improvements should be removed and legally disposed of off-site. Existing utilities should be removed and rerouted beyond the limits of the additions and the resulting excavations filled with controlled compacted fill.

After clearing and stripping, the existing fill and buried topsoil should be removed from within the building footprints for their full depth from below and up to five feet beyond the limits of the proposed additions. Portions of the existing fill materials which are free of topsoil or other deleterious materials could be segregated for reuse as controlled compacted fill. However, moisture contents on samples of the fill estimate that they are presently at or above levels which would allow immediate recompaction. Consequently, it should be anticipated that any controlled compacted fill required would need to consist of imported fill if the excavated fill soils cannot be aerated and dried.

After removal of the fill, the exposed subgrade materials should be proofrolled and compacted to a dense and unyielding consistency with several passes of a heavy, self-propelled, vibrating drum compactor with a minimum static drum weight of 12,000 pounds under the observation of a representative of MTA. Subgrade materials which are soft or unstable should be

excavated to the surface of competent soils and be backfilled with controlled compacted fill. Based on the boring results, it appears that the majority of the soils exposed after stripping of the topsoil and excavation of the existing fill would consist of silts and clayey silts. These materials are highly susceptible to softening and disturbance from slight changes in moisture content and when subjected to construction equipment traffic. Therefore, excavation of twelve inches or more of these soils could be required to achieve a stable subgrade, or aeration of the natural materials would be required. It may be prudent to proofroll the exposed subgrade soils with static methods to help limit disturbance. This determination should be made at the time of construction by a representative of MTA.

Any imported fill required to complete the site grading within the building addition areas should consist of uncontaminated, relatively well-graded granular soils containing less than 15 percent by weight of material passing a U.S. Standard No. 200 sieve and a maximum particle size of six inches. The fill supplier should provide documentation of the environmental quality of all imported fill.

All mass fill placed in the addition areas should be spread in layers on the order of twelve inches or less in loose thickness and uniformly compacted to at least 95 percent of their maximum dry density as determined by the ASTM D-1557 test procedure. Backfill placed in confined areas such as foundation or utility trench excavations should be spread in thinner layers and uniformly compacted to similar densities using manually operated compaction equipment.

Construction excavations should be performed in accordance with the most recent OSHA Excavation Guidelines and governing safety codes. Based on the results of our explorations, we

believe that the existing site soils would be considered a Type "C" soil as defined by the latest OSHA Excavation Regulations.

Decomposed and fractured shale was encountered in all of the borings at depths of approximately 5 to 16 feet below the existing surface grades. We believe that the upper decomposed shale materials which may extend into foundation and utility trenches could be excavated using excavation equipment equipped with rock teeth. Should deep excavations be necessary, the use of hydraulic jackhammers could be required.

Groundwater was encountered in two of the explorations at depths of approximately 15.5 to 19 feet below grade and mottling, which generally indicates seasonal high groundwater or seasonally saturated soils, was encountered in two of the explorations at depths of approximately ten to eleven feet below grade. While we do not believe that groundwater into construction excavations of shallow to moderate depths, typically less than five to ten feet, would be a major construction-related concern, some perched groundwater seepage, as well as surface runoff which enters into construction excavations, could be encountered. Any water seepage should be removed by pumping from sumps located within or adjacent to the excavations. The contract documents should require the contractor to provide the equipment and means necessary to maintain relatively dry excavations at all times.

Foundation Design Criteria: Following the previously described site preparation procedures, the proposed additions could be supported by conventional shallow foundations which derive their support from the undisturbed natural silty soils, decomposed bedrock, or controlled compacted fill installed to achieve the proposed floor slab subgrade levels since the natural silty and clayey soils are sensitive to disturbance. Foundations supported on these soils could be designed to

impose maximum allowable net bearing pressures of up to 4,000 pounds per square foot. It would be prudent to overexcavate the footing subgrades and place a six inch thick layer of clean, three-quarter inch crushed stone atop the exposed soils to protect them from the effects of moisture and/or foot traffic prior to the installation of concrete.

Exterior foundations should be established at least three feet below the lowest adjacent exterior grades, or deeper if required by local building codes, to provide protection from frost penetration. Foundations established adjacent to the existing building should match the existing foundations to prevent undermining of the existing structure. Interior foundations located in permanently heated portions of the proposed additions could be constructed at convenient depths below the ground floor slabs.

We estimate that post-construction settlements of foundations designed and installed in accordance with our recommendations will be on the order of one-half of one inch.

Seismic Design Criteria: Based on the subsurface conditions encountered in the explorations performed for this study, we estimate that the subsurface conditions would be representative of a Site Class "C" as defined by the International Building Code 2009, New Jersey Edition, for seismic design purposes.

Floor Slab Design Criteria: Following the previously described site preparation procedures, the ground floor slabs of the proposed additions may be supported on the natural soils or controlled compacted fill. We recommend that the ground floor slabs be underlain by a layer of six inches of clean, three-quarter inch crushed stone or washed gravel to provide a capillary break between the bottoms of the slabs and the underlying soils.

We estimate that post-construction settlements of floor slabs supported by materials which are prepared in accordance with our recommendations would be less than one-quarter of one inch.

Please feel free to contact us if you have any questions regarding this report.

The following Plates and Appendix are attached and complete this report:

Plate 1 – Site Location Map
Plate 2 – Plot Plan
Plates 3A through 3H – Logs of Borings
Plate 4 – Unified Soil Classification System
Plate 5 – Engineering Rock Classification & Core Description Chart
Plate 6 – Gradation Curves
Appendix – Limitations

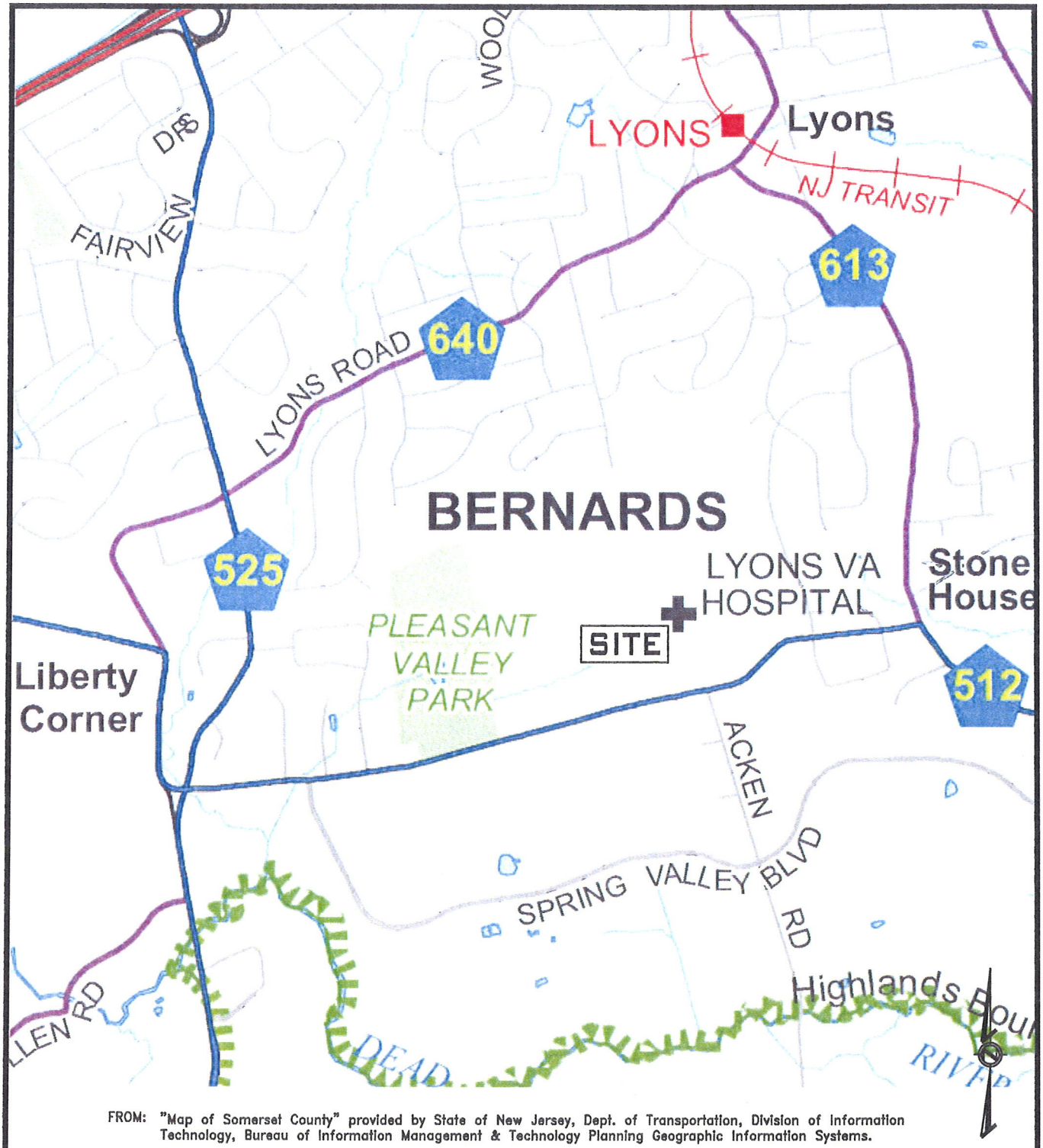
Respectfully submitted,

MELICK-TULLY and ASSOCIATES, P.C.

James H. Beattie, P.E.
Senior Associate

Raymond J. Tully, P.E.
President

JHB:RJT/mh
8743-002*1D
(3 copies submitted)



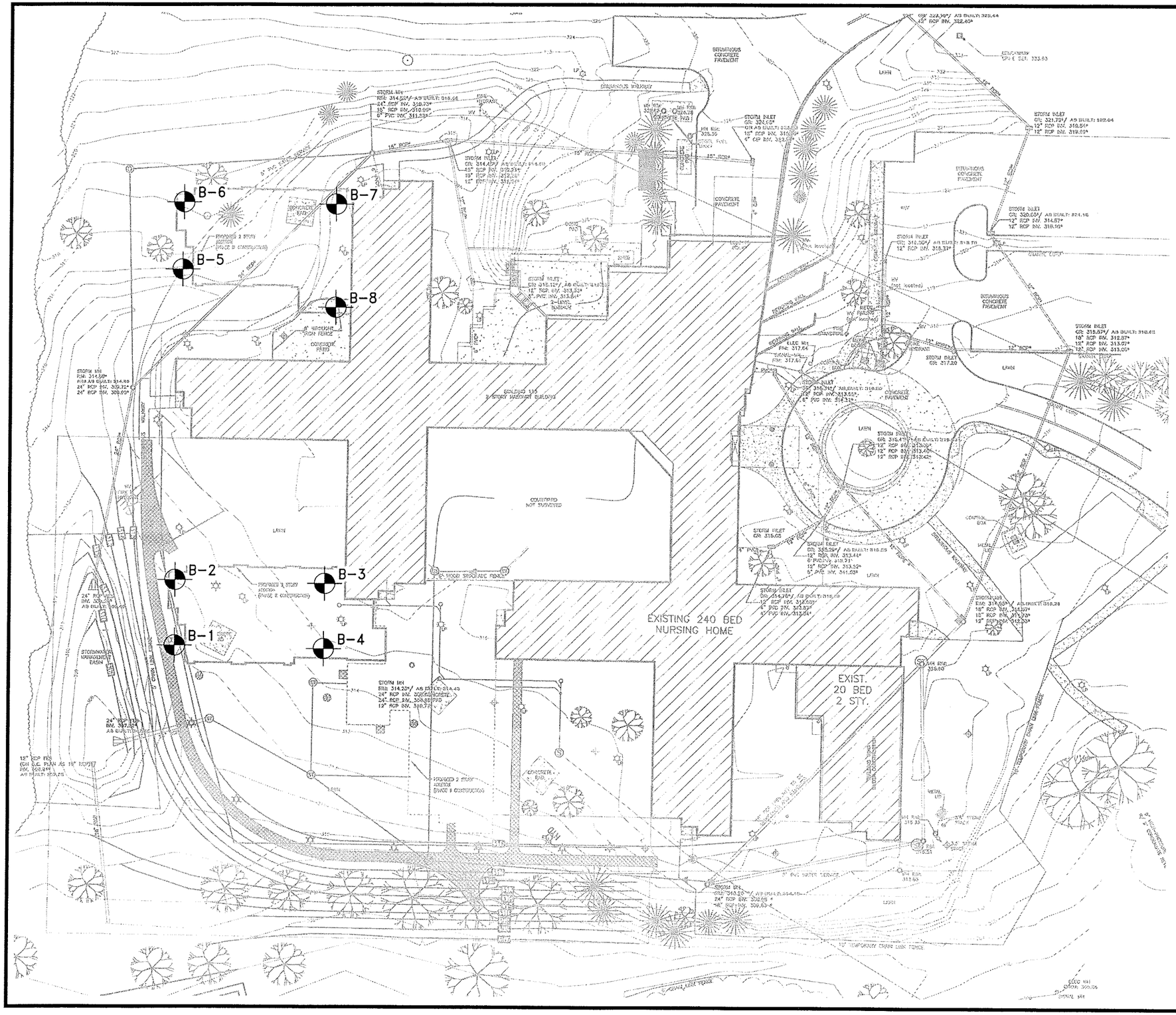
FROM: "Map of Somerset County" provided by State of New Jersey, Dept. of Transportation, Division of Information Technology, Bureau of Information Management & Technology Planning Geographic Information Systems.

MELICK-TULLY AND ASSOCIATES, P.C.
Geotechnical Engineers
& Environmental Consultants
117 Canal Road
South Bound Brook, New Jersey 08880
(732) 356-3400

SITE LOCATION MAP

PROPOSED BUILDING ADDITION
LYONS, NEW JERSEY
VETERANS AFFAIRS MEDICAL CENTER

JOB NO.	FILE NO.	DR. BY	CHK. BY	DATE	SCALE	PLATE
8743-002*1C	25159	VJD	JHB	10-27-11	1"=2,000'	1



KEY:

B-1 NUMBER AND APPROXIMATE LOCATION OF BORINGS PERFORMED FOR THIS STUDY

NOTES:

1. This drawing is part of Melick–Tully and Associates, P.C. Report No. 8743–002*1D and should be read together with the report for complete evaluation.

2. General layout was obtained from a drawing prepared by Fellenzer Engineering, LLP, entitled "Site, Existing Site for Phase III (Phase II Completion)" dated 9–23–11 (Progress Print 10–27–11), scale 1"=20'.

PLOT PLAN

PROPOSED BUILDING ADDITION
LYONS, NEW JERSEY
VETERANS AFFAIRS MEDICAL CENTER

MELICK–TULLY AND ASSOCIATES, P.C.
Geotechnical Engineers
& Environmental Consultants
117 Canal Road
South Bound Brook, New Jersey 08880
(732) 356–3400

JOB NO.	FILE NO.
8743–002*1C	25159

DR. BY	CHK. BY	DATE	SCALE	PLATE
VJD	JHB	11–1–11	1"=0'	2

LOG OF BORING

BORING NO. 1

COMPLETION DATE: 10/27/11 | SURFACE ELEVATION: +312 ft (±) | WATER LEVEL: *

JOB NUMBER: 8743-002*1D | READING DATE: 10/27/11

DEPTH (ft.)	SAMPLES	N-VALUE	MOISTURE CONTENT (%)	CORING TIME (MIN/FT)	SYMBOL	DESCRIPTION	DEPTH (ft.)
	S1	16	4.5			3" Topsoil	
						FILL - Red-brown fine gravel, some fine to coarse sand, little silt	
	S2	30			ML	Brown silty sand, with roots (original topsoil)	
5						Red-brown clayey silt, little fine to coarse sand, trace fine gravel (moist)(very stiff)	5
	S3	25					
10	S4	90				Red-brown highly decomposed shale bedrock	10
15	ROCK CORE NO. 1			9 10 11 11 8		Red-brown shale bedrock - very closely jointed NQ CORE RUN NO. 1: 15' to 20' REC = 73% RQD = 22%	15
20							20
25						Boring completed @ 20' *Groundwater not encountered	25
30							30

NOTES FOR COLUMNS:
1. SAMPLE AT AVERAGE SAMPLING DEPTH
2. INDICATES THE NUMBER OF BLOWS TO ADVANCE A 2" OD SAMPLER A DISTANCE OF 12 INCHES USING A 140 POUND WEIGHT FALLING 30 INCHES

SOIL DESCRIPTION MODIFIERS:
TRACE 0 - 10%
LITTLE 10 - 20%
SOME 20 - 35%
AND OVER 35%

Typist/Date: jhb/mh 11/11

Sheet: 1 of 1 PLATE: 3A

MELICK-TULLY AND ASSOCIATES, P.C.
Geotechnical Engineers and Environmental Consultants

LOG OF BORING

BORING NO. 2

COMPLETION DATE: 10/27/11 SURFACE ELEVATION: +313 ft (±) WATER LEVEL: *

JOB NUMBER: 8743-002*1D READING DATE: 10/27/11

DEPTH (ft.)	SAMPLES	N-VALUE	MOISTURE CONTENT (%)	CORING TIME (MIN/FT)	SYMBOL	DESCRIPTION	DEPTH (ft.)
	S1	20				8" Topsoil	
						FILL - Red-brown clayey silt, little fine to medium sand	
	S2	43			ML	Brown silty sand, with roots (original topsoil)	
5						Red-brown clayey silt, trace fine to coarse sand, trace fine gravel (moist)(hard)	5
	S3	29			ML	Red-brown clayey silt, trace fine to coarse sand, little fine gravel (moist)(very stiff)	
10	S4	91				Red-brown highly decomposed shale bedrock	10
15	S5	110/7"				Red-brown highly fractured shale bedrock	15
20	S6	50/2"					20
25	S7	50/1"				Boring completed @ 25'-1" *Groundwater not encountered	25
30							30

NOTES FOR COLUMNS:
1. SAMPLE AT AVERAGE SAMPLING DEPTH
2. INDICATES THE NUMBER OF BLOWS TO ADVANCE A 2" OD SAMPLER A DISTANCE OF 12 INCHES USING A 140 POUND WEIGHT FALLING 30 INCHES

SOIL DESCRIPTION MODIFIERS:
TRACE 0 - 10%
LITTLE 10 - 20%
SOME 20 - 35%
AND OVER 35%

Typist/Date: jhb/mh.11/11

Sheet: 1 of 1 PLATE: 3B

MELICK-TULLY AND ASSOCIATES, P.C.
Geotechnical Engineers and Environmental Consultants

LOG OF BORING

BORING NO. 3

COMPLETION DATE: 10/26/11 | SURFACE ELEVATION: +316 ft (±) | WATER LEVEL: *

JOB NUMBER: 8743-002*1D | READING DATE: 10/26/11

DEPTH (ft.)	SAMPLES	N-VALUE	MOISTURE CONTENT (%)	CORING TIME (MIN/FT)	SYMBOL	DESCRIPTION	DEPTH (ft.)
	S1	12				4" Topsoil	
	S2	25				FILL - Red-brown clayey silt, trace fine sand, little fine to coarse gravel	
5	S3	25	21.0			Brown silty sand, with roots (original topsoil)	5
					ML	Red-brown silt, some fine to coarse sand, trace fine gravel (moist)(very stiff)	
10	S4	20			ML	Yellow-brown clayey silt, little fine sand, little fine gravel (moist)(very stiff)	10
						Red-brown highly fractured shale bedrock	
15	S5	100/9"					15
20	S6	50/3"					20
	S7	50/0"				- auger refusal atop shale bedrock encountered @ 23'-6"	
25							25
						Boring completed @ 23'-6" Mottling observed @ 11' *Groundwater not encountered	
30							30

NOTES FOR COLUMNS:
1. SAMPLE AT AVERAGE SAMPLING DEPTH
2. INDICATES THE NUMBER OF BLOWS TO ADVANCE A 2" OD SAMPLER A DISTANCE OF 12 INCHES USING A 140 POUND WEIGHT FALLING 30 INCHES

SOIL DESCRIPTION MODIFIERS:
TRACE 0 - 10%
LITTLE 10 - 20%
SOME 20 - 35%
AND OVER 35%

Typist/Date: jhb/mh 11/11

Sheet: 1 of 1 PLATE: 3C

MELICK-TULLY AND ASSOCIATES, P.C.
Geotechnical Engineers and Environmental Consultants

LOG OF BORING

BORING NO. 4

COMPLETION DATE: 10/27/11 | SURFACE ELEVATION: +315 ft (±) | WATER LEVEL: *

JOB NUMBER: 8743-002*1D | READING DATE: 10/27/11

DEPTH (ft.)	SAMPLES	N-VALUE	MOISTURE CONTENT (%)	CORING TIME (MIN/FT)	SYMBOL	DESCRIPTION	DEPTH (ft.)
	S1	11	19.2			2" Topsoil	
	S2	27	11.1			FILL - Red-brown fine to coarse sand, some to and silt, little to some fine gravel	
5	S3	32			ML	Red-brown clayey silt, trace fine sand, some fine to coarse gravel (moist)(hard)	5
10	S4	12				Red-brown highly decomposed shale bedrock	10
15	S5	75/5"				Red-brown highly fractured shale bedrock	15
20	S6	50/1"				- auger refusal atop shale bedrock encountered @ 21'	20
25						Boring completed @ 21' Mottling observed @ 10' *Groundwater not encountered	25
30							30

NOTES FOR COLUMNS:
1. SAMPLE AT AVERAGE SAMPLING DEPTH
2. INDICATES THE NUMBER OF BLOWS TO ADVANCE A 2" OD SAMPLER A DISTANCE OF 12 INCHES USING A 140 POUND WEIGHT FALLING 30 INCHES

SOIL DESCRIPTION MODIFIERS:
TRACE 0 - 10%
LITTLE 10 - 20%
SOME 20 - 35%
AND OVER 35%

Typist/Date: jhb/mh 11/11

Sheet: 1 of 1 PLATE: 3D

MELICK-TULLY AND ASSOCIATES, P.C.
Geotechnical Engineers and Environmental Consultants

LOG OF BORING

BORING NO. 5

COMPLETION DATE: 10/26/11
JOB NUMBER: 8743-002*1D

SURFACE ELEVATION: +316 ft (±)

WATER LEVEL: 19'
READING DATE: 10/26/11

DEPTH (ft.)	SAMPLES	N-VALUE	MOISTURE CONTENT (%)	CORING TIME (MIN/FT)	SYMBOL	DESCRIPTION	DEPTH (ft.)
						8" Topsoil	
	S1	17			ML	Red-brown clayey silt, trace fine sand, little fine gravel (moist)(very stiff to hard)	
5	S2	36					5
	S3	30				Red-brown highly decomposed shale bedrock	
10	S4	50				Red-brown highly fractured shale bedrock	10
15	S5	120/10"					15
20	S6	75/3"					20
25						Boring completed @ 20'-9" Groundwater encountered @ 19'	25
30							30

NOTES FOR COLUMNS:
1. SAMPLE AT AVERAGE SAMPLING DEPTH
2. INDICATES THE NUMBER OF BLOWS TO ADVANCE A 2" OD SAMPLER A DISTANCE OF 12 INCHES USING A 140 POUND WEIGHT FALLING 30 INCHES

SOIL DESCRIPTION MODIFIERS:
TRACE 0 - 10%
LITTLE 10 - 20%
SOME 20 - 35%
AND OVER 35%

Typist/Date: jhb/mh 11/11

Sheet: 1 of 1 PLATE: 3E

MELICK-TULLY AND ASSOCIATES, P.C.
Geotechnical Engineers and Environmental Consultants

LOG OF BORING

BORING NO. 6

COMPLETION DATE: 10/26/11 | SURFACE ELEVATION: +318 ft (±) | WATER LEVEL: 15'-6"

JOB NUMBER: 8743-002*1D | READING DATE: 10/26/11

DEPTH (ft.)	SAMPLES	N-VALUE	MOISTURE CONTENT (%)	CORING TIME (MIN/FT)	SYMBOL	DESCRIPTION	DEPTH (ft.)
						8" Topsoil	
	S1	20			ML	Red-brown clayey silt, trace fine sand, trace to little fine to coarse gravel (moist)(very stiff)	
	S2	44	31.1				
5	S3	30			ML	Red-brown silt, some fine to coarse sand, trace fine gravel (very moist)(very stiff to hard)	5
	S4	42				Red-brown highly decomposed shale bedrock	
10	S5	102				Red-brown highly fractured shale bedrock	10
15	S6	94					15
20	S7	50/3"					20
25	S8	30/3"					25
						Boring completed @ 25'-9" Groundwater encountered @ 15'-6"	
30							30

NOTES FOR COLUMNS:
1. SAMPLE AT AVERAGE SAMPLING DEPTH
2. INDICATES THE NUMBER OF BLOWS TO ADVANCE A 2" OD SAMPLER A DISTANCE OF 12 INCHES USING A 140 POUND WEIGHT FALLING 30 INCHES

SOIL DESCRIPTION MODIFIERS:
TRACE 0 - 10%
LITTLE 10 - 20%
SOME 20 - 35%
AND OVER 35%

Typist/Date: jhb/mh 11/11

Sheet: 1 of 1 PLATE: 3F

MELICK-TULLY AND ASSOCIATES, P.C.
Geotechnical Engineers and Environmental Consultants

LOG OF BORING

BORING NO. 7

COMPLETION DATE: 10/26/11 | SURFACE ELEVATION: +316.5 ft (±) | WATER LEVEL: *

JOB NUMBER: 8743-002*1D | READING DATE: 10/26/11

DEPTH (ft.)	SAMPLES	N-VALUE	MOISTURE CONTENT (%)	CORING TIME (MIN/FT)	SYMBOL	DESCRIPTION	DEPTH (ft.)
	S1	25				6" Topsoil	
						FILL - Red-brown clayey silt, little fine to coarse sand, little fine to coarse gravel	
	S2	38			ML	Red-brown clayey silt, trace fine to coarse sand, trace fine gravel (moist)(hard)	
5	S3	39				Red-brown highly decomposed shale bedrock	5
10	S4	99/11"				Red-brown highly fractured shale bedrock	10
15	S5	100/6"					15
20	S6	50/1"					20
25						Boring completed @ 25' *Groundwater not encountered	25
30							30

NOTES FOR COLUMNS:
1. SAMPLE AT AVERAGE SAMPLING DEPTH
2. INDICATES THE NUMBER OF BLOWS TO ADVANCE A 2" OD SAMPLER A DISTANCE OF 12 INCHES USING A 140 POUND WEIGHT FALLING 30 INCHES

SOIL DESCRIPTION MODIFIERS:
TRACE 0 - 10%
LITTLE 10 - 20%
SOME 20 - 35%
AND OVER 35%

Typist/Date: jhb/mh 11/11

Sheet: 1 of 1 PLATE: 3G

MELICK-TULLY AND ASSOCIATES, P.C.
Geotechnical Engineers and Environmental Consultants

LOG OF BORING

BORING NO. 8

COMPLETION DATE: 10/26/11 | SURFACE ELEVATION: +317 ft (±) | WATER LEVEL: *

JOB NUMBER: 8743-002*1D | READING DATE: 10/26/11

DEPTH (ft.)	SAMPLES	N-VALUE	MOISTURE CONTENT (%)	CORING TIME (MIN/FT)	SYMBOL	DESCRIPTION	DEPTH (ft.)
	S1	28				4" Topsoil FILL - Brown clayey silt, little fine to coarse sand, little fine to coarse gravel	
	S2	55					
5	S3	27				Red-brown highly decomposed shale bedrock	5
10	S4	48				Red-brown highly fractured shale bedrock	10
15	S5	50/4"					15
20	S6	110/11"					20
25	S7	97/9"					25
30						Boring completed @ 26'-3" *Groundwater not encountered	30

NOTES FOR COLUMNS:
1. SAMPLE AT AVERAGE SAMPLING DEPTH
2. INDICATES THE NUMBER OF BLOWS TO ADVANCE A 2" OD SAMPLER A DISTANCE OF 12 INCHES USING A 140 POUND WEIGHT FALLING 30 INCHES

SOIL DESCRIPTION MODIFIERS:
TRACE 0 - 10%
LITTLE 10 - 20%
SOME 20 - 35%
AND OVER 35%

Typist/Date: jhb/mh 11/11

Sheet: 1 of 1 PLATE: 3H

MELICK-TULLY AND ASSOCIATES, P.C.
Geotechnical Engineers and Environmental Consultants

MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS More than 50% of material is LARGER than No. 200 Sieve	GRAVEL & GRAVELLY SOILS More than 50% of coarse fraction RETAINED on No. 4 Sieve	CLEAN GRAVELS (Little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines.
			GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines
		GRAVELS WITH FINES (Appreciable amount of fines)	GM	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels, gravel-sand-clay mixtures.
	SAND AND SANDY SOILS More than 50% of coarse fraction PASSING a No. 4 Sieve	CLEAN SAND (Little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines.
			SP	Poorly-graded sands, gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amount of fines)	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures.
FINE GRAINED SOILS More than 50% of material is SMALLER than No. 200 Sieve.	SILTS AND CLAYS	Liquid limit LESS than 50	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS	Liquid limit GREATER than 50	MH	Inorganic silts, micaceous or diatomaceous fine sand or silty soils.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS			PT	Peat, humus, swamp soils with high organic contents

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS.

GRADATION*	COMPACTNESS* sand and/or gravel	CONSISTENCY* clay and/or silt
% Finer by Weight	Relative Density	Range of Shearing Strength in Pounds per Square Foot

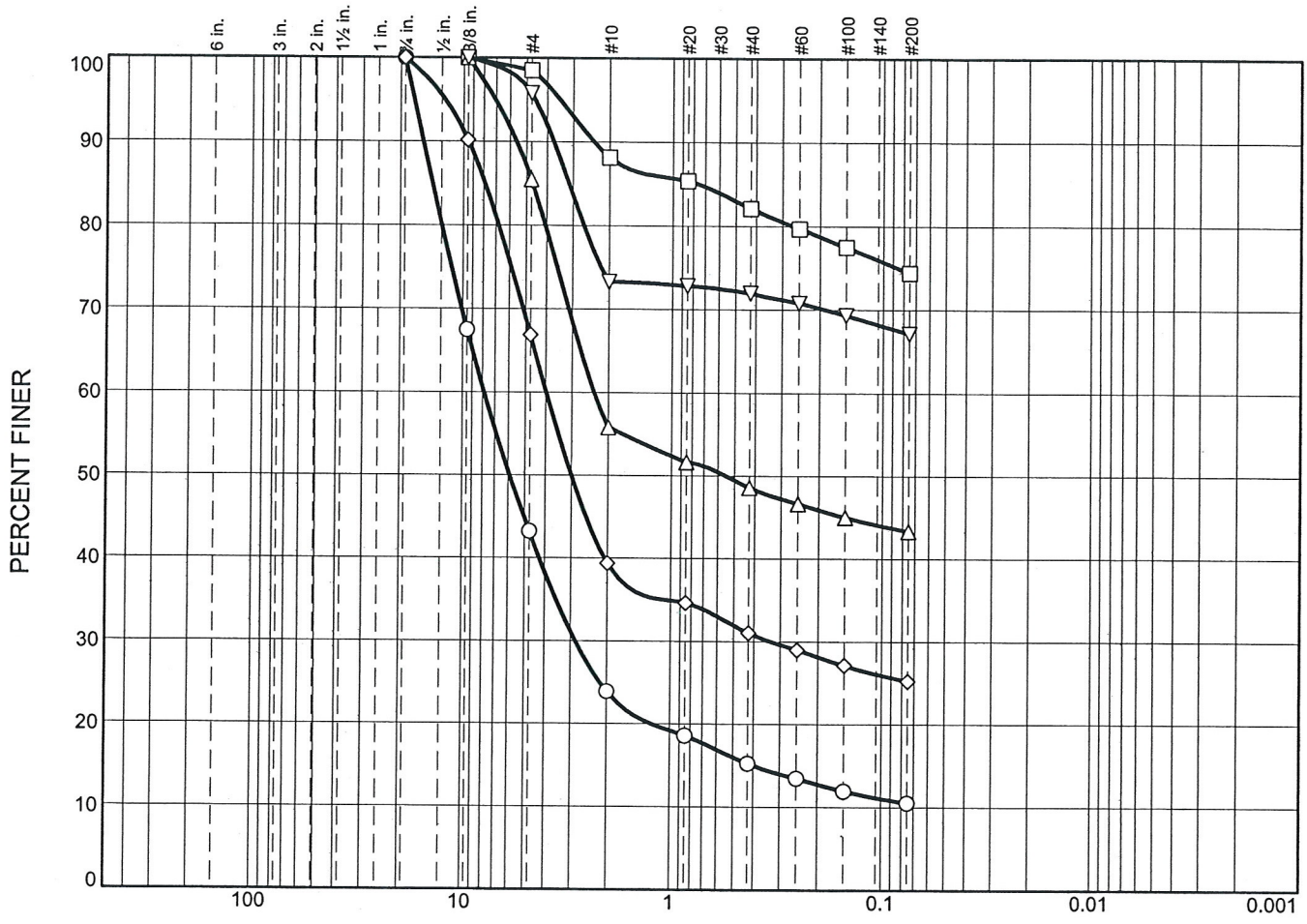
Trace	0% to 10%	Loose	0% to 40%	Very Soft	less than 250
Little	10% to 20%	Medium Dense	40% to 70%	Soft	250 to 500
Some	20% to 35%	Dense	70% to 90%	Medium	500 to 1000
And	35% to 50%	Very Dense	90% to 100%	Stiff	1000 to 2000
				Very Stiff	2000 to 4000
				Hard	Greater than 4000

**Values are from laboratory or field test data, where applicable. When no testing was performed, values are estimated.*

UNIFIED SOIL CLASSIFICATION SYSTEM

SOIL CLASSIFICATION CHART

Gradation Curve(s)



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	
○	0.0	0.0	56.7	19.4	8.7	4.7	10.5
□	0.0	0.0	1.5	10.4	6.0	7.7	74.4
△	0.0	0.0	14.5	29.7	7.2	5.2	43.4
◇	0.0	0.0	33.1	27.5	8.4	5.8	25.2
▽	0.0	0.0	4.2	22.5	1.3	4.8	67.2

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	B-1	S-1	0-2	Fine Gravel, some f-c Sand, little Silt. (MC=4.5%)	Fill
□	B-3	S-3	4-8	Silt, some fine to coarse Sand, trace fine Gravel. (MC=21.0%)	ML
△	B-4	S-1	0-2	Fine to coarse Sand, and Silt, little fine Gravel. (MC=19.2%)	Fill
◇	B-4	S-2	2-4	Fine to coarse Sand, some Silt, some fine Gravel. (MC=11.1%)	Fill
▽	B-6	S-2	2-4	Silt, some fine to coarse Sand, trace fine Gravel. (MC=31.1%)	ML

Melick-Tully & Associates, P.C.

South Bound Brook, NJ

Client: Veterans Affairs Medical Center

Project: Proposed Building Additions, Lyons, New Jersey

Project No.: 8743-002

Plate 6

APPENDIX

APPENDIX

Limitations

A. Subsurface Information

Locations: The locations of the explorations were determined by survey locations provided by Fellenzer Engineering, LLP. Elevations of the explorations were approximately determined by interpolation between contours shown on topographic plans provided to us by the site engineer. The locations and elevations of the explorations should be considered accurate only to the degree implied by the method used.

Interface of Strata: The stratification lines shown on the individual logs of the subsurface explorations represent the approximate boundaries between soil types, and the transitions may be gradual.

Field Logs/Final Logs: A field log was prepared for each exploration by a member of our staff. The field log contains factual information and interpretation of the soil conditions between samples. Our recommendations are based on the final logs as shown in this report and the information contained therein, and not on the field logs. The final logs represent our interpretation of the contents of the field logs, and the results of the laboratory observations and/or tests of the field samples.

Water Levels: Water level readings have been made in the explorations at times and under conditions stated on the individual logs. These data have been reviewed and interpretations made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater will occur due to variations in rainfall, temperature, and other factors.

Pollution/Contamination: Unless specifically indicated to the contrary in this report, the scope of our services was limited only to investigation and evaluation of the geotechnical engineering aspects of the site conditions, and did not include any consideration of potential site pollution or contamination resulting from the presence of chemicals, metals, radioactive elements, etc. This report offers no facts or opinions related to potential pollution/contamination of the site.

Environmental Considerations: Unless specifically indicated to the contrary in this report, this report does not address environmental considerations which may affect the site development, e.g., wetlands determinations, flora and fauna, wildlife, etc. The conclusions and recommendations of this report are not intended to supersede any environmental conditions which should be reflected in the site planning.

B. Applicability of Report

This report has been prepared in accordance with generally accepted soils and foundation engineering practices for the exclusive use of The Veterans Administration Medical Center for specific application to the design of the proposed additions. No other warranty, expressed or implied, is made.

This report may be referred to in the project specifications for general information purposes only, but should not be used as the technical specifications for the work, as it was prepared for design purposes exclusively.

C. Reinterpretation of Recommendations

Change in Location or Nature of Facilities: In the event that any changes in the nature, design or location of the additions are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing.

Changed Conditions During Construction: The analyses and recommendations submitted in this report are based in part upon the data obtained from eight widely-spaced test borings performed for this study. The nature and extent of variations between the explorations may not become evident until construction. If variations then appear evident, it will be necessary to reevaluate the recommendations of this report.

Changes in State-of-the-Art: The conclusions and recommendations contained in this report are based upon the applicable standards of our profession at the time this report was prepared.

D. Use of Report by Prospective Bidders

This soil and foundation engineering report was prepared for the project by Melick-Tully and Associates, P.C. for design purposes and may not be sufficient to prepare an accurate bid. Contractors utilizing the information in the report should do so with the express understanding that its scope was developed to address design considerations. Prospective bidders should obtain the owner's permission to perform whatever additional explorations or data gathering they deem necessary to prepare their bid accurately.

E. Construction Observation

We recommend that Melick-Tully and Associates, P.C. be retained to provide on-site soils engineering services during the earthwork construction and foundation phases of the work. This is to observe compliance with the design concepts and to allow changes in the event that subsurface conditions differ from those anticipated prior to the start of construction.